CLAIMS

What is claimed is:

1 A unit cell of a readout integrated circuit operable during a frame period, comprising:

a detector node for coupling to a radiation detector that is operable in at least two radiation wavelength bands;

a first circuit coupled to said detector node for setting a bias potential at said detector node as a function of a selected radiation band to be detected;

a second circuit coupled between said detector node and an integration capacitance for selectively coupling said integration capacitance to said detector node as a function of the selected radiation band to be detected for sourcing current towards said detector node or for sourcing current from said detector node;

a third circuit coupled to said integration capacitance for periodically resetting said integration capacitance; and

a plurality of averaging capacitances switchably coupled to said integration capacitance for storing charge integrated during sub-frame averaging periods of said frame period.

2. A unit cell as in claim 1, wherein said first circuit is comprised of a switch coupled between a source of detector bias and said detector node.

3. A unit cell as in claim 1, wherein said first circuit is comprised of a first switch coupled between a first source of detector bias and said detector

node, and a second switch coupled between a second source of detector bias and said detector node.

4. A unit cell as in claim 1, wherein said second circuit is comprised of a first direct injection FET coupled in parallel with a second direct injection FET.

5. A unit cell as in claim 1, wherein said third circuit is comprised of a first switch coupled between a first source of integration capacitance reset potential and said integration capacitance, and a second switch coupled between a second source of integration capacitance reset potential and said integration capacitance.

6. A unit cell as in claim 1, wherein individual ones of said plurality of averaging capacitances are switchably coupled to said integration capacitance through an individual one of a plurality of switches.

7. A unit cell as in claim 1, wherein said circuits are controlled so as to perform a first plurality of sub-frame integrations of a signal present at said detector node corresponding to energy detected in a first spectral band, followed by an integration of a signal present at said detector node corresponding to energy detected in a second spectral band, followed by a second plurality of sub-frame integrations of a signal present at said detector node corresponding to energy detected in said first spectral band.

8. A unit cell as in claim 7, wherein said first spectral band corresponds to long wavelength infrared radiation (LWIR), and wherein said second spectral band corresponds to medium wavelength infrared radiation (MWIR).

9. A unit cell as in claim 1, wherein said third circuit further operates to inhibit an accumulation of excessive charge on said integration capacitance.

10. A method for operating a unit cell of a readout integrated circuit, comprising:

during a first portion of a frame period, integrating a first signal detected in a first spectral band;

during a second portion of the frame period, integrating a first signal detected in a second spectral band; and

at the end of the frame period, reading out the integrated signals for each spectral band.

11. A method as in claim 10, where the step of integrating the first signal detected in the first spectral band further comprises storing the integrated first signal, where the step of integrating the first signal detected in the second spectral band further comprises storing the integrated first signal; and further comprising:

during a third portion of the frame period, integrating a second signal detected in the first spectral band and combining the integrated second signal with the stored and integrated first signal;

and where the step of reading out reads out the combined integrated signals and the stored and integrated first signal in the second spectral band.

12. A unit cell of a readout integrated circuit coupled during use to a multi-spectral radiation detector, comprising first circuitry operable, during a first portion of a frame period, for integrating a first signal detected in a first spectral band; second circuitry operable, during a second portion of the frame period, for integrating a first signal detected in a second spectral band; and third circuitry,

responsive to an end of the frame period, for reading out the integrated signals for each spectral band.

13. A unit cell as in claim 12, and further comprising:

circuitry for storing the integrated first signal in the first spectral band and the integrated signal in the second spectral band; where

said first circuitry is operable during a third portion of the frame period for integrating a second signal detected in the first spectral band and for combining the integrated second signal with the stored and integrated first signal; and where

said third circuitry reads out the combined integrated signals and the stored and integrated first signal in the second spectral band.

14. A method for operating a unit cell of a readout integrated circuit so as to temporally align an image obtained in a first spectral band with a an image obtained in a second spectral band, comprising:

during a first portion of a frame period, performing at least one integration and storing a first signal detected in a first spectral band;

during a second portion of the frame period, performing at least one integration and storing a first signal detected in a second spectral band;

during a third portion of the frame period, performing at least one integration and storing a second signal detected in the first spectral band for combining the signals stored during the first and third portions of the frame period; and

at the end of the frame period, reading out the signals stored for each spectral band.

15. A method as in claim 14, wherein the signals stored for each spectral band are read out simultaneously from the unit cell.

16. A method as in claim 14, wherein the signals stored for each spectral band are read out sequentially from the unit cell.

17. A method as in claim 14, wherein performing at least one integration in the first spectral band performs a plurality of consecutive sub-integrations of the first signal, and stores the result of each sub-integration on a first sub-frame averaging capacitance.

18. A method as in claim 17, wherein performing at least one integration in the second spectral band performs a single integration of the first signal, and stores the result of the integration on a second sub-frame averaging capacitance.

19. A method in claim 14, wherein said first spectral band corresponds to medium wavelength infrared radiation (MWIR), and wherein said second spectral band corresponds to long wavelength infrared radiation (LWIR).

20. A radiation detection assembly, comprising a plurality of multi-spectral radiation detectors and a plurality of readout circuit unit cells, individual ones of said readout circuit unit cells being electrically coupled to one of said multi-spectral radiation detectors through a node and comprising circuitry for reading out from said multi-spectral radiation detector, in a time division multiplex (TDM) manner, electrical signals generated by incident multi-spectral radiation.

21. A method for operating a radiation detection assembly, comprising:

providing a plurality of multi-spectral radiation detectors and a plurality of readout circuit unit cells, where individual ones of said readout circuit unit cells are electrically coupled to one of said multi-spectral radiation detectors through a node; and

reading out from said multi-spectral radiation detector, in a time division multiplex (TDM) manner, electrical signals generated by incident multi-spectral radiation.